GRETSA UNIVERSITY - THIKA

UNIVERSITY EXAMINATIONS

JANUARY – APRIL 2026 SEMESTER

BACHELOR OF COMPUTER SCIENCE

COURSE CODE: BSCS 105

COURSE TITLE: DIGITAL ELECTRONICS I

DATE: 10 APRIL 2026 **TIME: 2 HOURS**

INSTRUCTIONS TO CANDIDATES

1. SECTION A IS **COMPULSORY.**
2. SECTION B: ANSWER ANY OTHER **TWO** QUESTIONS.
3. **DO NOT** WRITE ANYTHING ON THIS QUESTION PAPER AS IT WILL BE AN EXAM IRREGULARITY.
4. ALL ROUGH WORK SHOULD BE AT THE BACK OF YOUR ANSWER BOOKLET AND CROSSED OUT.

CAUTION: *All exam rooms are under CCTV surveillance during the examination period.*

SECTION A: COMPULSORY

Question One

a) Define digital electronics and distinguish it from analog electronics. **[6 Marks]**

b) Explain the importance of number systems in digital electronics. **[6 Marks]**

c) Demonstrate binary addition and subtraction using 1's complement. **[6 Marks]**

d) Analyze the role of Boolean algebra in simplifying logic circuits. **[6 Marks]**

e) Evaluate the ethical and practical implications of digital systems in everyday life. **[6 Marks]**

SECTION B: ANSWER ANY TWO QUESTIONS

Question Two

a) State the basic logic gates and their symbols. **[5 mark**s]

b) Explain how NAND and NOR gates are universal. **[5 Marks]**

c) Apply Boolean laws to simplify the expression: [AB + A$\overline{B}$]. **[5 Marks]**

d) Analyze the advantages of using K-maps in circuit simplification. **[5 Marks]**

Question Three

a) Define a half adder. **[5 Marks]**

b) Explain the difference between half adder and full adder. **[5 Marks]**

c) Apply the concept of multiplexers in data selection. **[5 Marks]**

d) Analyze the role of encoders and decoders in communication systems. **[5 Marks]**

Question Four

a) Identify the types of flip-flops. **[5 Marks]**

b) Explain the function of a JK flip-flop. **[5 Marks]**

c) Apply flip-flops to design a simple counter. **[5 Marks]**

d) Evaluate the importance of timing diagrams in sequential circuits. **[5 Marks]**

Question Five

a) Define memory devices used in digital electronics. **[5 Marks]**

b) Explain the difference between RAM and ROM. **[5 Marks]**

c) Apply EEPROM in real-world applications. **[5 Marks]**

d) Design a simple memory organization diagram for a microcontroller. **[5 Marks]**